

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of :
Yoshio TAKAHASHI et al. : Attn: BOX PCT
Serial No. NEW : Docket No. 2001-1458A
Filed October 2, 2001 :

IMAGE INPUT APPARATUS
[Corresponding to PCT/JP01/00737
Filed February 2, 2001]

PRELIMINARY AMENDMENT

Assistant Commissioner for Patents,
Washington, DC 20231

Sir:

Prior to examination of the above-referenced U.S. patent application please amend the application as follows:

IN THE SPECIFICATION

Please amend the specification as follows:

Please replace the paragraph beginning at page 19, line 13, to page 20, line 2, with the following rewritten paragraph:

As described above, according to this embodiment, the stepwise difference in density between pixels which are positioned in adjacent places to the adjoining chips 3 and 4 of the image sensor is obtained for plural lines and averaged, the stepwise difference in density between the chips is compensated for each line by employing each of the obtained mean values, and thereafter the image is read. Therefore, it is only required to provide a memory that holds the gamma compensation value for one chip as the reference for the density stepwise difference compensation, thereby suppressing an increase in the memory. Further, the density stepwise difference between the chips can be always compensated regardless of the secular change without

troubling the user. In addition, variations of the gamma characteristics within one chip can be also compensated, whereby a good read-in result can be obtained.

IN THE CLAIMS

Please amend the claims as follows:

5. (Amended) The image input apparatus of Claim 1 wherein,
in calculation of the stepwise difference in density between the image signals,
a difference of pixel data on the chip boundary is taken as the stepwise difference in
density between the image signals.

13. (Amended) The image input apparatus of Claim 1 wherein,
when real-time screen display of an input image is performed, the screen display is
performed from a line which has been subjected to the addition of the stepwise difference in
density between the chips.

IN THE ABSTRACT

Please replace the original abstract with the enclosed substitute abstract.

REMARKS

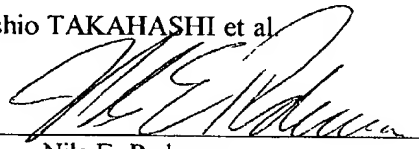
The above amendments have been made to make minor editorial changes so as to generally improve the form of the specification. Also, the present Preliminary Amendment is submitted to delete the multiple dependency of the claims, thereby placing such claims in condition for examination and reducing the required PTO filing fee.

Attached hereto is a marked-up version of the changes made to the specification, claims and abstract by the current Preliminary Amendment. The attached page is captioned "Version With Markings to Show Changes Made".

Respectfully submitted,

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October 2, 2001

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employing the gamma compensation value, and

the stepwise difference in density is uniformly added to chips except for the chip as the reference.

4. The image input apparatus of Claim 2 wherein

the stepwise difference in density of the image signals between the adjacent chips is calculated for image data which has been subjected to the compensation of the image signals by employing the gamma compensation value, and

the stepwise difference in density is added to respective pixels in stages for chips except the chip as the reference from the end of the chips.

Claim 1

5. The image input apparatus of any of Claims 1 to 4 wherein, in calculation of the stepwise difference in density between the image signals,

a difference of pixel data on the chip boundary is taken as the stepwise difference in density between the image signals.

6. The image input apparatus of Claim 5 wherein,

in the calculation of the stepwise difference in density between the image signals,

a mean of differences of pixel data on chip boundaries for several lines is taken as the stepwise difference in density between the image signals.

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DESCRIPTION

IMAGE INPUT APPARATUS

Technical Field

The present invention relates to an image input apparatus and, more particularly, to a structure for effectively reducing stepwise differences in density between chips in an image sensor of an image scanner.

Background Art

Conventionally, in an image scanner which requires a large image sensor for reading a relatively large object, such as a desktop type, plural chips of the same standard are arranged adjacently and an image of the object is read by employing output signals from the respective chips. The image scanner having such a structure initially measures gamma characteristics for each chip and compensates each gamma compensation value for each corresponding chip when an image is inputted, thereby resolving manufacture variations among the respective chips to obtain a fine image.

However, when chip characteristics are varied due to changes over time or the like, it is necessary to measure and compensate the gamma characteristics on all such occasions.' In addition, when there are different gamma characteristics within

claim 1

13. The image input apparatus of ^{claim 1}any of Claims 1 to 12 wherein, when real-time screen display of an input image is performed, the screen display is performed from a line which has been subjected to the addition of the stepwise difference in density between the chips.

14. The image input apparatus of Claim 13 wherein the calculated stepwise difference in density is added from a first one of the read lines,

when last several lines are not processed, display is performed on a screen from the first line, and

the last several lines which are not processed are not displayed on the screen.

15. The image input apparatus of Claim 13 wherein, when the calculated stepwise difference in density is added from a line delayed by several lines, the line delayed by the several lines to the last line are displayed on the screen.

16. The image input apparatus of Claim 1 comprising:
a density stepwise difference correcting means for, when the calculated stepwise difference in density is compared to a predetermined threshold value and the calculated stepwise difference in density is larger than the threshold value,

In an image input apparatus having an image sensor composed of plural chips, the stepwise difference in density on a chip boundary is made inconspicuous by a few compensation memories.

The image input apparatus obtains the stepwise differences in density between pixels positioned in the adjacent places to adjoining chips³[2] and [3]⁴ of the image sensor for plural lines and averages the differences, and reads an image and displays the same on a screen after compensating the stepwise difference in density between the chips for each line by using the average value.

[illegible]

The image input apparatus obtains the stepwise differences in density between pixels positioned in the adjacent places to adjoining chips 3 and 4 of the image sensor for plural lines and averages the differences, and reads an image and displays the same on a screen after compensating the stepwise difference in density between the chips for each line by using the average value.